

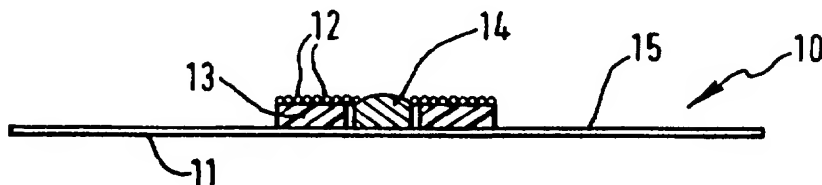


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61K 9/70, 9/00, A61N 2/08, A61F 13/02, A61H 39/00	A1	(11) International Publication Number: WO 97/20549 (43) International Publication Date: 12 June 1997 (12.06.97)
(21) International Application Number: PCT/GB96/03009 (22) International Filing Date: 5 December 1996 (05.12.96) (30) Priority Data: 9524865.4 5 December 1995 (05.12.95) GB 9609478.4 7 May 1996 (07.05.96) GB (71)(72) Applicant and Inventor: JEHAN, David [GB/GB]; 16 Richmond Court, George Road, Birmingham B15 1PT (GB). (74) Agent: EVERSHEDS; 10 Newhall Street, Birmingham B3 3LX (GB).		(81) Designated States: AM, AT, AU, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: PATCH CARRYING A PARTICULATE MATERIAL AND A MAGNET**(57) Abstract**

A patch structure (10) for transdermal therapy comprises a layer of sheet material (11) carrying particulate material (12) of copper, held by an adhesive pad (13) in a ring formation about a zinc coated rare earth magnet (14). Sheet material (11) carries a further layer (15) of adhesive for application to the skin (not shown). In use a number of benefits are derived, including the generation of very small electromagnetic impulses which are particularly useful in the treatment of skeletal or muscular pain.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

PATCH CARRYING A PARTICULATE MATERIAL AND A MAGNET

This invention relates to patch structures for transdermal therapy.

Patches are well known for providing treatment of varying effects directly through or on the skin. The most well known being the nicotine patch and hormone replacement patches. Other examples include patches containing metallic sheet material, such as copper (as disclosed in *WO95/09591*) or magnetic therapy (as disclosed in GB Patent *1596314*). Existing patches have a number of disadvantages. Nicotine patches and the like tend to release their active ingredients relatively quickly and thus it is not easy to maintain either a controlled dose, or a slow release. Also in some patches the active ingredients are in powder form and can be partially or totally covered by the adhesive used to adhere them to the patch, thereby restricting their effect.

In other cases, such as simple dressings the active ingredients may be applied in liquid form and these tend to dry in an uncontrolled manner. Patches incorporating metallic strips or sheets have an added disadvantage in that they do not always provide a high or uniform contact with the skin, in that the sheets do not always follow the contour of the body and thus only partial contact, and sometimes very low contact is achieved. Also the metal may have sharp edges which can cause injury. In many cases sweat is relied upon to provide a carrier to the skin can actually accumulate and form a barrier as can the presence of hair. It has also been found that the adhesives used to bond the active ingredients to the patch can irritate more sensitive skin types, rendering the use of patches impossible in some cases.

It is one object of the present invention to overcome the disadvantages of the above as well as to provide a more versatile and universal patch structure.

According to the present invention a patch structure for transdermal therapy comprises at least one layer of sheet material having on at least one surface thereof a plurality of particulate material together with at least one magnet.

The particulate material preferably comprises one or more metals such as zinc, copper and/or alloys thereof, and may be provided by a combination of zinc and copper.

The magnet may be a rare earth magnet and may be coated, with plastics material or with zinc, copper or suitable alloy thereof.

Preferably the particulate material is of a shape which does not abrade the skin, for example it may be provided with a rounded surface and may be of any suitable shape such as spherical.

The sheet material provides a carrier for the particulate material but may also be an active ingredient itself. The carrier may be a pad of a foam or other elastomeric material. The sheet material may be made of any convenient material used in or suitable for skin contact, for example hypo-allergic material for prolonged use, and all or part of one surface of the sheet material may carry an adhesive for applying to the skin. The sheet material may be of more than one layer in that there is provided a first layer on which the particulate material is carried or embedded, and a second or subsequent layer carrying the first layer and adapted to overlie the skin. The sheet material may be any convenient shape, such as circular or oval or the like.

The particulate material may be of any suitable material including or incorporating one or any combination of the following materials; metallic, ceramic, gelatinous, or of soluble plastics, natural sponge, cellulose, or any suitable material capable of carrying a required substance for therapy. The particulate material may be formed from any combination of materials. Thus a combination of metallic, magnetic and ceramic particles, for example may be used to enhance performance or to create a variety of effects.

The particulate material may be in any convenient shape, such as spherical, or size, such as between 45 to 1000 micron. For example the particulate material may be

of any shape both regular and irregular, symmetrical or non-symmetrical. Some shapes, such as cylinders may be bound or co-joined to form tufts. The particulate material may be solid, hollow or porous, and may itself be the active ingredient or act as a carrier for said ingredient. The particulate material may be arranged in any formation as suits the particular application. It will be seen that where certain shapes of material are used spaces will naturally form between. Alternatively the material can be arranged so that definite spaces are provided. It is an advantage that the spaces tend to fill with sweat enhancing contact with the skin.

The particulate material may be bonded to the sheet material using any standard adhesive. It will be seen that the particulate material may extend from the adhesive to ensure said adhesive has no or minimum contact with the skin. The adhesive may be applied as a layer or may be discrete. The bonding material may be absorbent or waterproof, and may itself carry an active ingredient.

Generally a patch having this structure will have on a single surface the area carrying the particulate material thereon together with an area bearing the adhesive for adhering to the skin. Alternatively, where the user has sensitive skin the patch carries no additional adhesive and is held on the skin by other means. One solution is to provide adhesive on the surface of the patch remote from the active ingredients so that the patch can be adhered inside clothing, or to the inside of a band such as a wristband or a waistband or the like. The need for adhesives can be reduced or eliminated by trapping the particulate material between a permeable layer of sheet material and the carrier material to ensure that there can be no direct contact between the skin and the adhesive bonding the particulate material. It is a particular advantage of elongate particles arranged in tufts or in tuftlike array the skin can be kept free from the adhesive.

It is to be noted that the invention is not restricted to relatively small patches that are normally envisaged, but may be employed on a larger scale depending on the application or surface area.

The particulate material itself may be self-bonded where the active material is flexible or elastic such as an impregnated cellulose.

In one embodiment of the present invention a patch structure comprises a layer of sheet material carrying, on at least one area of one surface thereof, a plurality of spherical particles of zinc and of copper arranged in a formation so that the particles are in close proximity but may or not be touching. When placed on the skin, either by conventional adhesive or by other means described elsewhere very small electromagnetic impulses are generated, useful in the treatment of skeletal or muscular pain, for example arthritis.

In another embodiment the particulate material is a ceramic of a size between 800 to 1000 micron and impregnated with an active ingredient, the particles are arranged in formation in one or more planes and bonded together and then adhered to the sheet material. It will be appreciated that by varying the manner in which the particles are bonded together the manner in which the active ingredient(s) is absorbed can be varied.

In one embodiment a size range of between 200-600 microns may be employed.

In another embodiment the particulate material is provided by spheres of copper, of 0.5mm diameter and arranged to surround in close formation a small magnet, or an array of magnetised particulate material, which arrangement may be bonded directly to the carrier or may be embedded in a flexible layer bonded to the carrier. The use of a magnet or magnetised particulate material assists in promoting the generation of electromagnetic impulse and/or current and/or magnetic field. Alternatively the particulate material may comprise at least two different metals.

Any suitable magnet, whole or in particulate form may be used but preferably rare earth magnets, such as samarium or neodymium ion boron, are used.

Such magnets are powerful for their size and thus much small magnets can be used to the same effect. In one embodiment a neodymium ion boron magnet of a size 3mm across by 1mm deep and a strength of 2000 oersteds is preferred.

The magnet or magnetic particles are preferably coated with a suitable material, e.g. zinc or plastics.

In another embodiment of the present invention a plurality of layers of spherical granules of copper, of a size between 45 up to 1000 micron and covering an area of 30mm square. When the resulting arrangement is applied to the skin the sweat from the skin is drawn up by the capillary action created between the granules which results in an improved circulation of the sweat. Hair on the skin can also be accommodated between the granules more readily. The arrangement may be gently massaged to provide or enhance pressure point stimulation by the granules on the skin. This arrangement may be used with a magnet as in other embodiments. The movement of copper particles in the magnetic field generates very small electric impulses.

In another embodiment porous copper spheres may be provided and can act as a carrier for another active ingredient, or a catalyst for example.

Arrangements of these later embodiments can also provide a cushion or cushions to protect the wearer against injury from other components of the patch, such as a large magnet of the type described in GB Patent *1596314*.

The Invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 is an enlarged plan of a patch in accordance with one embodiment of the invention;

Figure 2 is a section of the line II-II of Figure 1; and

Figure 3 corresponds to Figure 1 but shows a patch in accordance with a further embodiment of the invention.

In Figures 1 and 2 a patch structure 10 for transdermal therapy comprises a layer of sheet material 11 carrying particulate material 12 of copper, held by an adhesive pad 13 in a ring formation about a zinc coated rare earth magnet 14. The sheet material 11 is provided with a further layer of adhesive 15 for application to the skin(not shown).

In the embodiment of Figure 3 the patch structure 10 is provided with a plurality of areas of zinc particles 16 and copper particles 17 arranged in formation so that the particle areas are in close proximity but do not touch, and surround a rare earth magnet 18. Again the sheet material carries an adhesive layer 15.

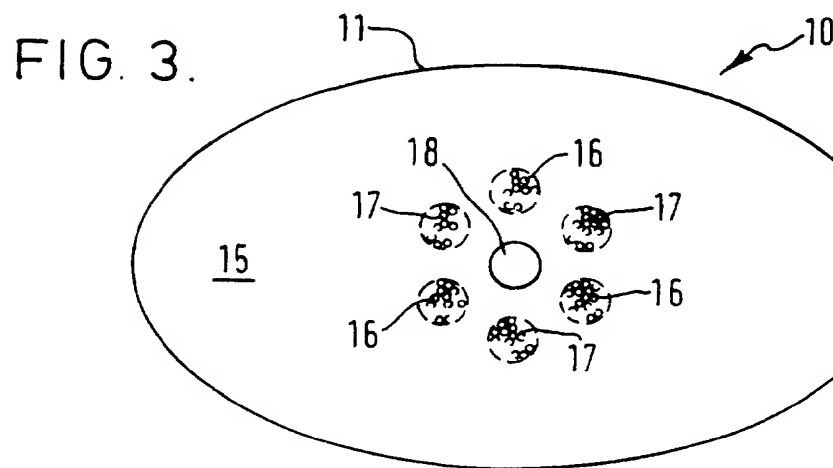
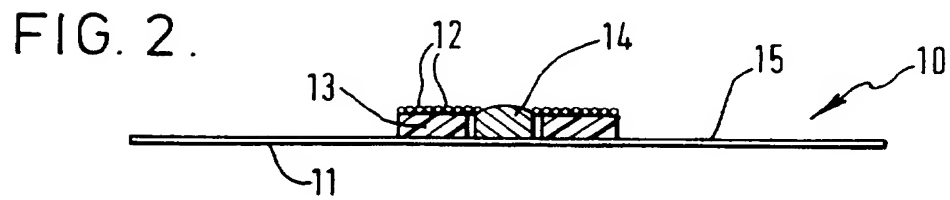
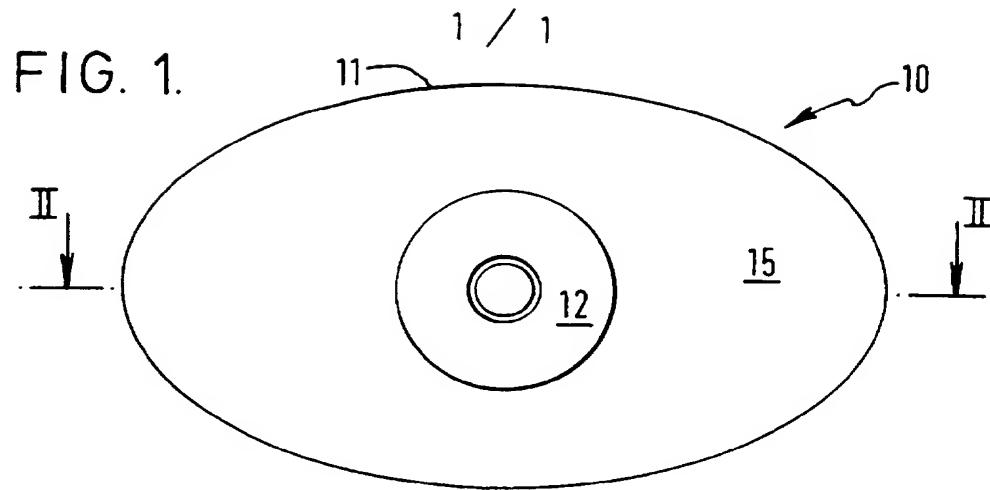
CLAIMS

1. A patch structure for transdermal therapy comprising at least one layer of sheet material having on at least one surface thereof a plurality of particulate material together with at least one magnet.
2. A patch structure for transdermal therapy as in Claim 1 wherein the particulate material contains zinc or an alloy thereof.
3. A patch structure for transdermal therapy as in Claim 1 wherein the particulate material contains copper or an alloy thereof .
4. A patch structure for transdermal therapy as in any preceding Claim wherein the particulate material comprises a combination of zinc and copper particles.
5. A patch structure for transdermal therapy as in any preceding Claim wherein the magnet is a rare earth magnet.
6. A patch structure for transdermal therapy as in any preceding Claim wherein the magnet is coated.
7. A patch structure for transdermal therapy as in Claim 6 wherein the magnet is coated with zinc or zinc alloy.
8. A patch structure for transdermal therapy as in Claim 6 wherein the magnet is coated with copper or copper alloy.

9. A patch structure for transdermal therapy as in Claim 6 wherein the magnet is coated with plastics.

10. A patch structure for transdermal therapy as in any preceding Claim wherein the particles are provided with a rounded surface so as not to abrade the skin.

11. A patch structure for transdermal therapy as in any preceding Claim wherein the sheet material provides a carrier for the particulate material and carries adhesive for applying the patch to the skin.



INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 96/03009

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61K9/70 A61K9/00 A61N2/08 A61F13/02 A61H39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61K A61N A61F A61H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 052 993 A (NECO AG) 4 February 1981	1,11
Y	see the whole document ---	2-10
X	EP 0 081 109 A (ENERGY-PAK LTD) 15 June 1983	1,11
Y	see page 1, paragraph 3; claim 1; figure 1 ---	2-10
Y	WO 95 09591 A (ROBINSON & SONS LTD.) 13 April 1995 see page 3, paragraph 4; claims 1-8 ---	2-10
Y	WO 84 00298 A (KÖSPONTI VALTO-ES HITELBANK RT.) 2 February 1984 see page 2, line 32 - page 3, line 21 ---	2-10
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

10 March 1997

Date of mailing of the international search report

01.04.97

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+ 31-70) 340-3016

Authorized officer

Tzschoppe, D

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 96/03009

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category "	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Section Ch, Week 8404 Derwent Publications Ltd., London, GB; Class B07, AN 84-019994 XP002027228 & JP 49 020 321 A (TANAKA E) , 22 February 1974</p>	1,11
Y	<p>see abstract</p> <p>---</p>	2-10
X	<p>DATABASE WPI Section Ch, Week 8447 Derwent Publications Ltd., London, GB; Class B07, AN 84-290855 XP002027229 & JP 59 055 824 A (UNO K) , 31 March 1984</p>	1,11
Y	<p>see abstract</p> <p>---</p>	2-10
Y	<p>DATABASE WPI Section Ch, Week 8433 Derwent Publications Ltd., London, GB; Class A96, AN 84-203893 XP002027230 & JP 59 116 214 A (MAGNE KK) , 5 July 1984 see abstract</p> <p>-----</p>	2-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 96/03009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2052993 A	04-02-81	DE 7919808 U FR 2460660 A	31-10-79 30-01-81
EP 81109 A	15-06-83	NONE	
WO 9509591 A	13-04-95	AU 7816994 A	01-05-95
WO 8400298 A	02-02-84	AU 565141 B AU 1775683 A BE 897292 A CA 1228540 A CH 664896 A DE 3390091 C FR 2531862 A GB 2133287 A,B HK 44488 A JP 8011733 B JP 59501265 T NL 8320207 T SE 462198 B SE 8401113 A SU 1489574 A US 4755384 A	03-09-87 08-02-84 03-11-83 27-10-87 15-04-88 18-03-93 24-02-84 25-07-84 17-06-88 07-02-96 19-07-84 01-06-84 21-05-90 29-02-84 23-06-89 05-07-88